

1 RECOILING STRIKING DEVICE

2
3 CROSS-REFERENCE TO RELATED APPLICATION

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5 This application claims the benefit of U.S. Provisional
6 Patent Application No. 60/398,251, filed 24 July 2002.

7
8 Field of the Invention

9
10 This invention relates to striking devices, such as
11 hammers and the like.

12
13 More particularly, the present invention relates to
14 striking devices incorporating recoil apparatus.

15
16
17 Background of the Invention

18
19 In the building industry, striking devices, such as
20 hammers and the like (hereinafter "hammer") are used for a
21 multitude of purposes including driving nails, straightening
22 and/or adjusting items, and various other actions requiring a
23 striking motion from a heavy solid tool. In a days work, for
24 example, a carpenter can perform thousands of strikes with a
25 hammer. Each time the hammer is used to strike an object the
26 force of the strike rebounds or reacts through the handle and

1 against the user's hand and arm. Thus, the carpenter who
2 performs thousands of strikes with a hammer receives
3 thousands of substantially equal and opposite rebound forces
4 on his hand and arm. These rebound forces can eventually
5 cause serious health problems and even prevent further work
6 by the carpenter.

7
8 It would be highly advantageous, therefore, to remedy
9 the foregoing and other deficiencies inherent in the prior
10 art.

11
12 Accordingly, it is an object the present invention to
13 provide a new and improved hammer incorporating recoil
14 apparatus that reduces or eliminates the rebound or shock
15 forces on the user's hand and arm.

16
17 Another object of the present invention is to provide a
18 new and improved hammer incorporating recoil apparatus that
19 is simple and inexpensive to manufacture.

20
21 And another object of the present invention is to
22 provide a new and improved hammer incorporating recoil
23 apparatus that does not reduce the efficiency of the hammer.

1 SUMMARY OF THE INVENTION

2
3 Briefly, to achieve the desired objects of the instant
4 invention in accordance with a preferred embodiment thereof,
5 provided is a striking device including a head having a
6 striking surface and a base mounted on an end of a handle for
7 reciprocation in a linear motion. A rail structure is
8 carried by the end of the handle. A rail receiving structure
9 is carried by the base and receives the rail structure for
10 reciprocating linear motion of the head between a forward
11 position and a rearward position. A biasing structure biases
12 the head into the forward position.

13
14 In a specific aspect, the rail structure includes a pair
15 of rail tabs fixedly attached to the end of the handle at
16 opposite sides thereof. The rail structure includes a pair
17 of rail clamps each including a generally U-shaped vertical
18 slot which encompasses approximately one-half of the end of
19 the handle and which are fixedly attached to opposite sides
20 thereof. The rail receiving structure includes opposed
21 elongated slide slots formed on opposite sides of the base
22 receiving the rails tabs.

23
24 In another aspect of the invention, the biasing
25 structure includes an opening formed in the head, defined by
26 a forward surface and a rearward surface. A tang extends
27 longitudinally from the end of the handle and into the

1 opening. A compression spring is carried between the tang
2 and the forward surface of the head. The spring biases the
3 forward surface of the head away from the tang and positions
4 the tang proximate the rearward surface of the head.

1 Brief Description of the Drawings

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3 The foregoing and further and more specific objects and
4 advantages of the invention will become readily apparent to
5 those skilled in the art from the following detailed
6 description of a preferred embodiment thereof, taken in
7 conjunction with the drawings in which:

8
9 FIG. 1 is an exploded view in perspective of a hammer
10 incorporating recoil apparatus in accordance with the present
11 invention;

12
13 FIG. 2 is a sectional view of the hammer of FIG. 1,
14 illustrating the inner assembly;

15
16 FIG. 3 is a front view of the hammer of FIG. 1;

17
18 FIG. 4 is a view in perspective of the hammer of FIG. 1
19 assembled and in the normal or at-rest orientation;

20
21 FIG. 5 is a view in perspective of the hammer of FIG. 1
22 assembled and in a recoil orientation immediately subsequent
23 to the act of striking an object;

1 FIG. 6 is a side view of the hammer of FIG. 1 in a
2 striking position; and

3
4 FIG. 7 is a side view of the hammer of FIG. 1 in the
5 process of striking an object, illustrating the recoil
6 orientation.

1 Detailed Description of a Preferred Embodiment

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3 Turning now to the drawings in which like reference

4 characters indicate corresponding elements throughout the

5 several views, attention is directed to FIGS. 1-3, which

6 illustrate a striking device, hereinafter hammer 10. Hammer

7 10 includes a handle 12 and a head 13 with a striking surface

8 15 and claws 16. An opening 18 is formed in head 13 for

9 mounting head 13 on handle 12. Generally, opening 18 is

10 similar to mounting openings formed in the heads of prior art

11 hammers for receiving the head end of an associated handle

12 and is defined by an inner surface having a forward surface,

13 toward the striking surface, and a rearward surface. As in

14 any standard hammer, head 13 is used for driving nails or

15 striking objects and claws 16 are used for pulling nails or

16 otherwise applying a lever action to objects. It will be

17 understood that while claws 16 are shown in this embodiment,

18 they may be omitted as desired.

19

20 In hammer 10, a tang 20 is imbedded in the head-end of

21 handle 12 so as to extend outwardly therefrom in a

22 longitudinal direction. Further, tang 20 is formed and

23 positioned so that a rear edge 22 butts against the rearward

24 surface of opening 18 adjacent claws 16 when handle 12 is

25 properly engaged with head 13. The front edge of tang 20 is

26 sloped or angled downward toward the front of hammer 10

1 increasing the width of tang 20 toward the head-end of handle
2 12 so as to provide a maximum amount of rigidity. In this
3 preferred embodiment tang 20 is formed of a very rigid metal,
4 such as steel or the like. Also, it should be understood
5 that while tang 20 is imbedded in handle 12, which is
6 constructed of wood or the like in this example, in hammers
7 that include a metal handle tang 20 could be formed as an
8 integral part of the handle.

9
10 The upper end of tang 20 is constructed with a forward-
11 facing flat surface on the forward edge and a small nipple 24
12 is formed on the flat surface for engaging one end of a
13 compression spring 30. A second nipple 26 is formed on the
14 forward surface of opening 18 facing tang 20 and aligned with
15 nipple 24 so as to receive and engage the opposite end of
16 compression spring 30. Compression spring 30 biases the
17 forward surface of opening 18 of head 13 away from tang 20
18 with the rearward surface of opening 18 positioned tightly
19 against the rear edge of tang 20, as illustrated best in FIG.

20 2.

21
22 The lower portion or base of head 13 carries a rail
23 receiving structure. In this preferred embodiment, the rail
24 receiving structure includes opposed elongated slide slots 32
25 and 33 formed on opposite sides of the base. Slide slots 32
26 and 33 extend from back to front of head 13 (i.e., from

1 adjacent claws 16 to adjacent surface 15). In this preferred
2 embodiment, slide slots 32 and 33 are formed as an integral
3 part of head 13. However, in specific applications or in
4 renovations (i.e., after market renovations) the slide slots
5 can be formed as a separate component that can be attached to
6 the lower surface of a hammerhead already in existence.

7
8 A rail structure is carried by the head-end of handle
9 12. In this embodiment, the rail structure includes a pair
10 of rail clamps or grips 35 and 36 fixedly attached to the
11 head-end of handle 12 at opposite sides thereof. Rail grips
12 35 and 36 are each formed with a generally U-shaped vertical
13 slot 38 and 39, respectively that is designed to encompass
14 approximately one-half of the head-end of handle 12. Each
15 rail grip 35 and 36 includes an inwardly directed rail or
16 rail tab 41 and 42, respectively. Rail grips 35 and 36 are
17 positioned so rail tabs 41 and 42 slideably engage in slide
18 slots 32 and 33, respectively, for relative backward and
19 forward movement between head 13 and handle 12. In other
20 words, rail tabs 41 and 42, and slide slots 32 and 33
21 facilitate reciprocating linear movement of head 13 between a
22 forward position and a rearward position. A linear motion
23 maintains the orientation of the striking surface of head 13.
24 In this preferred embodiment, rail grips 35 and 36 are
25 positioned on opposite sides of the head end of handle 12 and
26 affixed to handle 12 by means of a clamping screw 45 that

1 extends through rail grip 35 and handle 12 and is threadedly
2 engaged in rail grip 36. It should be understood that single
3 rails and grips or multiple combinations thereof can be
4 employed.

5
6 In the assembly process, tang 20 on handle 12 is
7 inserted into opening 18 of head 13. Compression spring 30
8 is positioned between the front surface of tang 20 and the
9 rearwardly facing inner surface of opening 18 with one end
10 engaged over nipple 24 and the other end engaged over nipple
11 26. In this orientation the rear edge of tang 20 is biased
12 tightly against the forwardly facing inner surface of opening
13 18. Rail grips 35 and 36 are then assembled on the head-end
14 of handle 12 so that rail tabs 41 and 42 are slideably
15 engaged in slide slots 32 and 33, respectively. Clamping
16 screw 45 is then inserted through the holes in rail grip 35
17 and handle 12 and screwed into the threaded hole in rail grip
18 36 to tightly clamp rail grips 35 and 36 onto the head-end of
19 handle 12. Assembled hammer 10 now appears, as illustrated
20 in FIGS. 3, 4, and 6, generally similar in appearance to
21 prior art hammers. However, the recoil apparatus provides
22 for limited transverse movement of head 13 relative to handle
23 12 during striking operations.

24
25 In operation, as hammer 10 is brought into contact with
26 an object it is desired to strike, such as a nail or surface

1 50 illustrated in FIG. 7, the full impact of hammer 10
2 strikes surface 50. However, handle 12 continues to move as
3 spring 30 is compressed and the shock of the strike is
4 absorbed. In this recoil orientation, rail tabs 41 and 42 on
5 rail grips 35 and 36, respectively, slide forward in slide
6 slots 32 and 33, allowing tang 20 to move forward in opening
7 18 and compress spring 30. The compression of spring 30
8 absorbs all or a substantial amount of the shock force that
9 would normally be transmitted to handle 12 when head 13
10 strikes object 50. Subsequent to the strike, compression
11 spring 30 immediately expands to move head 13 back into the
12 normal or pre-strike orientation in readiness for the next
13 strike. Furthermore, the lateral translation of bead 13
14 allows claws 16 to be used in a generally conventional
15 manner.

16
17 Here it should be noted that the recoil apparatus,
18 including spring 30, can be constructed to accommodate
19 different size and weight hammers. Also, different size
20 compression springs (e.g., different amounts of compression)
21 can be incorporated to accommodate users with more or less
22 powerful striking capabilities. Further, many hammers or
23 other striking devices already on the market or in use can be
24 modified to incorporate the novel recoil apparatus. Once the
25 recoil apparatus is incorporated spring 30 can be easily
26 changed to accommodate different users.

1 Thus, a new and improved hammer incorporating novel
2 recoil apparatus has been disclosed, which is highly
3 adaptable and easy to operate. Specifically, the new and
4 improved hammer and recoil apparatus reduces or eliminates
5 the rebound or shock forces on the user's hand and arm.
6 Further, the new and improved hammer and recoil apparatus is
7 simple and inexpensive to manufacture and does not reduce the
8 efficiency of the hammer.

9 Various changes and modifications to the embodiments
10 herein chosen for purposes of illustration will readily occur
11 to those skilled in the art. To the extent that such
12 modifications and variations do not depart from the spirit of
13 the invention, they are intended to be included within the
14 scope thereof which is assessed only by a fair interpretation
15 of the following claims.

16
17 Having fully described the invention in such clear and
18 concise terms as to enable those skilled in the art to
19 understand and practice the same, the invention claimed is: